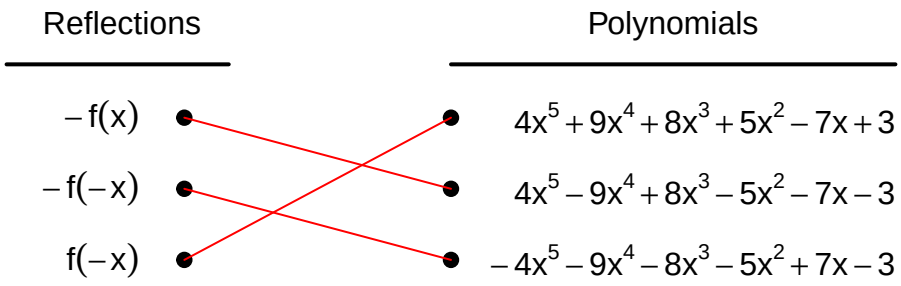
Name: Date:

Exam: Function Reflections (Solution version 4)

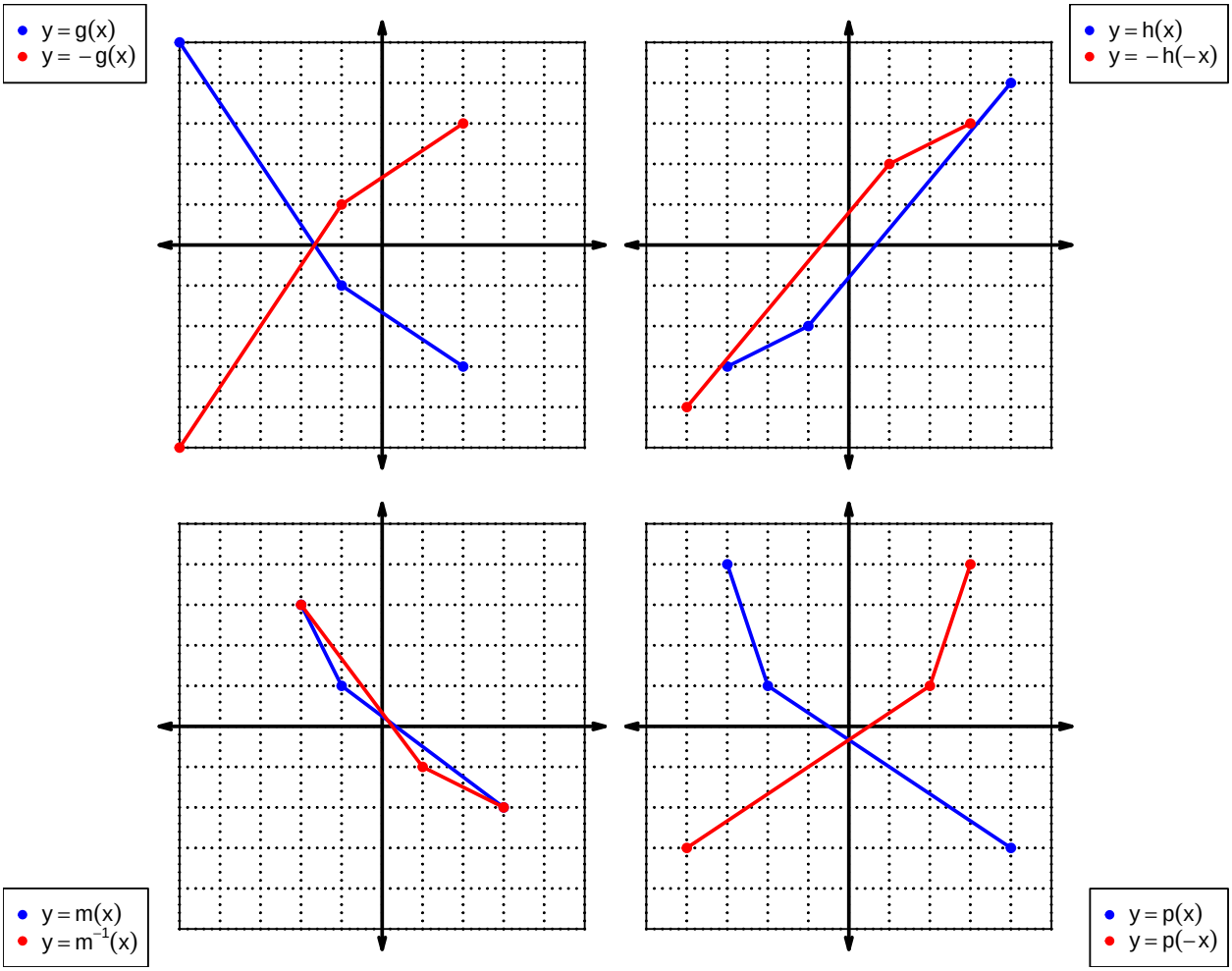
1. Let function f be defined by the polynomial below:

$$f(x) = -4x^5 + 9x^4 - 8x^3 + 5x^2 + 7x + 3$$

Draw lines that match each function reflection with its polynomial:



2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f, g, and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	2	3	4
2	3	4	6
3	9	7	1
4	6	9	7
5	4	1	5
6	7	6	9
7	5	8	2
8	1	5	3
9	8	2	8

3. Evaluate $g(7)$.

$$g(7) = 8$$

4. Evaluate $h^{-1}(1)$.

$$h^{-1}(1) = 3$$

5. By filling more rows of the table, it is possible to make function f **even**. If that were done, what would be the value of $f(-9)$?

If function f is even, then

$$f(-9) = 8$$

6. By filling more rows of the table, it is possible to make function g **odd**. If that were done, what would be the value of $g(-2)$?

If function g is odd, then

$$g(-2) = -4$$

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7. A function, f, is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g, is **odd** if $g(x) = -g(-x)$ for all x in the domain.
   Let polynomial p be defined with the following equation:

$$p(x) = -x^2 + 1$$

   a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^2 + 1$$
$$p(-x) = -x^2 + 1$$

   b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -\left(-x^2 + 1\right)$$
$$-p(-x) = x^2 - 1$$

   c. Is polynomial p even, odd, or neither?

   even

   d. Explain how you know the answer to part c.

   We see that $p(x) = p(-x)$ for all x because $p(x)$ and $p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an even function.

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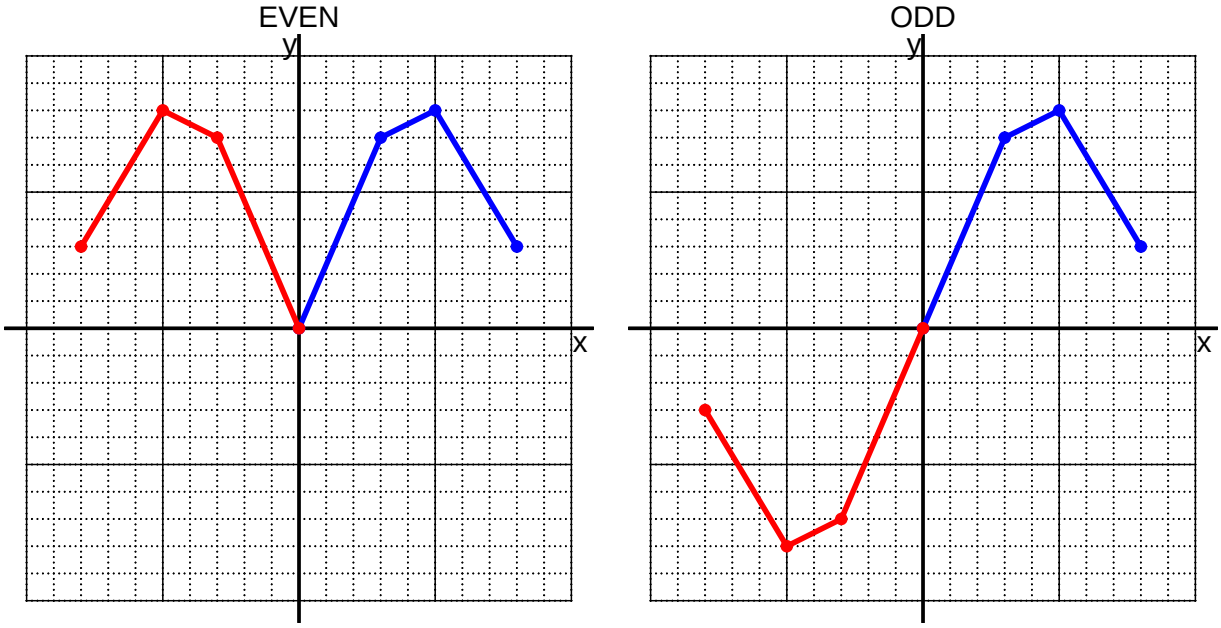
8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 8x - 4$$

a. Evaluate $f(7)$.

step 1: multiply by 8
step 2: subtract 4

$$f(7) = 8(7) - 4$$
$$f(7) = 52$$

b. Evaluate $f^{-1}(76)$.

step 1: add 4
step 2: divide by 8

$$f^{-1}(x) = \frac{x+4}{8}$$
$$f^{-1}(76) = \frac{(76)+4}{8}$$
$$f^{-1}(76) = 10$$

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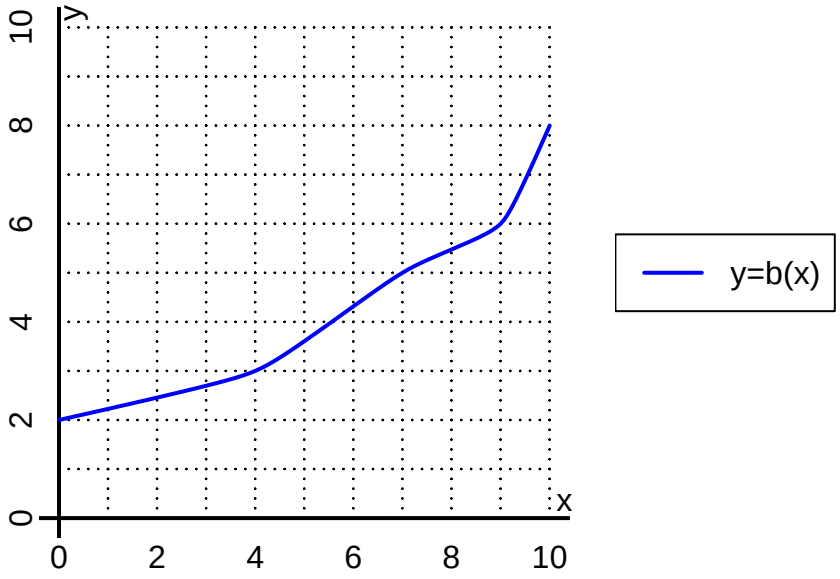
10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(9)$.

$b(9) = 6$

b. Evaluate $b^{-1}(3)$.

$b^{-1}(3) = 4$

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11. Function f is defined by the table below.

    a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-6	6	6	-6
-1	8	-8	-8	8
0	0	0	0	0
1	-8	8	8	-8
2	6	-6	-6	6

b. Is function f even, odd, or neither?

odd

c. How do you know the answer to part b?

Function f is odd because column $-f(-x)$ matches column $f(x)$ exactly.